JPRS: 4288

27 December 1960

LEADING SOVIET AIRCRAFT DESIGNERS

Unsigned

Photocopies of this report may be purchased from:

PHOTODUPLICATION SERVICE
LIBRARY OF CONGRESS
WASHINGTON 25, D. C.

U. S. JOINT PUBLICATIONS RESEARCH SERVICE
1636 CONNECTICUT AVENUE, N. W.
WASHINGTON 25, D. C.

F O R E W O R D

This publication was prepared under contract by the UNITED STATES JOINT PUBLICATIONS RESEARCH SERVICE, a federal government organization established to service the translation and research needs of the various government departments.

JPRS: 4288

CSO: 1257-S

LEADING SOVIET AIRCRAFT DESIGNERS

/Following is the translation of six articles on Soviet aircraft designers in the book Nashi Kryl'ya (Our Wings), Moscow, 1959, pages 60-62, 68-70, 159-164, 185-190./

The Beginning of the Way

The creative path of the noted Soviet aircraft designer, Twice Hero of Socialist Labor, Laureate of the Lenin Prize, Andrey Nikolayevich Tupolev, is a path of bold daring, innovating decisions, and remarkable triumphs in the building of our aircraft. The first phases of this glorious path are described by A. N. Tupolev's closest co-worker, who has been working with Tupolev for many years, well known aircraft designer and Hero of Socialist Labor, Aleksandr Aleksandrovich Arkhangel'skiy.

Andrey Nikolayevich Tupolev began his creative work as far back as 1909.

In the years 1909-1913, Prof, N. Ye. Zhukovskiy had gathered together a group of young students, aviation enthusiasts all, who became his closest disciples. Among them was A. N. Tupolev. The group, led by N. Ye. Zhukovskiy, designed and built in the Moscow Technical High School two aerodynamic tunnels, a propeller-testing device, as well as other equipment. An aerodynamic laboratory was set up.

The crew led by N. Ye. Zhukovskiy dreamed of a design office and testing plant for the manufacture of new aircraft. But the only thing realized was the establishment in the School of an experimental center -- the Computing-Testing Bureau. N. Ye. Zhukovskiy was chosen head of the Bureau. A. N. Tupolev directed the work on aerodynamic computations, while V. P. Vetchinkin supervised aircraft stability and propellers computations.

The Great October Socialist Revolution brought about vast changes in the work of our scientists, modifying fundamentally its scope and organization. The Soviet government ordered the establishment of TsAGI (Tsentral'nyy aerogidrodinamicheskiy institut -- Central Aerohydrodynamic Institute).

By this time A. N. Tupolev, who had just defended successfully his diploma project, had gained experience in scientific-experimental and organizational work. It was quite natural, therefore, that precisely he became one of the closest aides to Nikolay Yegorovich in organizing TsAGI.

TsAGI embarked on its mission of experimental aircraft construction, enlisting in this task its whole theoretical, laboratory, and production activities.

The year 1922 saw the designing and building of the first airplane -- the "ANT-1." By this time a small group of designers had been formed with A. N. Tupolev at the head. Our institutes and metallurgists worked hard at this time to develop our own light alloys. Sharing in this effort also was the design bureau of Tupolev, which had subordinated its collective being to the idea of metal aircraft production. The year 1924 saw the building of the first all-metal passenger plane. It was named the "ANT-2." This aircraft laid the foundation of a new trend in aircraft construction, namely, metal aircraft manufacturing.

After the purely experimental aircraft "ANT-1" and "ANT-2", the work of A. N. Tupolev's design crew became closely allied to the requirements of our Air Fleet and, as far as possible, to the domestic aircraft industry then in its embroyonic stage.

The first aircraft ordered by the Air Fleet was the reconnaissance plane "ANT-3," which was accepted for service in the /military/ Air Forces.

The next job -- the "TB-1" -- became noted for the two fundamental trends which it embodied and which have been followed by A. N. Tupolev and his crew in all subsequent work. This was the first monoplane and, in addition, the first heavy bomber -- the first-born, so to speak, of the forthcoming series of bombers to be built by the talented designer. Tupolev stuck firmly to the monoplane design and never once deviated from it in all his subsequent work.

The eleven-passenger "ANT-9" was designed and built on the basis of the TB-1." The plane had three air-cooled engines: two on the wings and one in the nose. It developed speed of 210 kilometers per hour.

The "ANT-9" was put into series production and served a long time in our Civil Air Fleet.

Toward 1930 the design crew headed by A. N. Tupolev designed and built the "ANT-6," representing a new landmark in the history of Soviet aviation. This aircraft (better known as the "TB-3" bomber) was an improvement on the "TB-1." At the time it was not only the largest land plane in the world but also the best in its flight qualities. Its four engines had a capacity of 2,400 horsepower, its take-off weight reached 24,500 kilograms, while its maximum range was in the neighborhood of 2,000 kilometers.

Our aircraft industry gained its first experience in mass production when this plane was put into series production. The "TB-3" was the favorite plane of our combat pilots; they were used as bombers, cargo, and transport planes.

Perhaps the most outstanding accomplishment of A. N. Tupolev's crew in the thirties was the giant "ANT-20" (The "Maksim Gor'kiy"). Its wing span was 63 meters, length 32.5 meters, normal take-off weight 42 tons, load weight 53 tons, speed 260 kilometers per hour, and ceiling 6,000 meters. The "Maksim Gor'kiy" was the world's largest land plane.

In carrying out the government's orders to design and build a special plane for long range flights, in 1934 Tupolev's crew came up with the noted "ANT-25" or "RD" ("Rekord dal'nosti" -- Distance Record). This aircraft represented an exceedingly interesting technical solution of the assigned job.

The year 1935 saw the building of the "SB" high speed bomber.

At the time this plane was built the maximum speed of the best domestic and foreign bombers was 270-280 kilometers per hour. The "SB" exceeded this figure by about 150 kilometers.

Such are the main landmarks of the creative path taken by the crew headed by A. N. Tupolev.

The Struggle With Altitude

The first altitude flights in our country took place in 1929. Here is what a participant in these flights, pilot Tomas Pavlovich Suzi, has to say about them:

"I knocked together a small group. We flew all sorts of planes, with oxygen equipment and without it. We climbed to 7,000-8,200 meters altitude. I personally remained for an hour and fifty minutes at 8,100 meters altitude without an oxygen mask. But before I reached that altitude I had lost consciousness four times. Having lost control of the plane it dropped to 4,000 meters. There I came to and started climbing again. At 8,000 meters the temperature reached 34 degrees below freezing and then -- 42 degrees. In winter flights we withstood 58 degrees below freezing."

In 1932, T. P. Suzi set a world record by climbing to 8,100 meters.

Some time later the Italian pilot Donati reached an altitude of 14,433 meters. Returning from this flight Donati could hardly stand on his feet because of fatigue. Pale and worn out, he told his friends gathered around him at the airport:

"I climbed virtually to the limit of human endurance. My machine could have climbed still higher but man, alas, is not a machine."

But Donati was mistaken in saying that he had reached the threshold of human endurance. On 21 November 1935, his record was broken by Soviet pilot Vladimir Konstantinovich Kokkinaki.

Kokkinaki had prepared himself long and carefully for his record flight. Somehow he managed to reach 10,000 meters altitude. "I reached ten thousand," said he, grinning, " 'sat a while' and started off again."

10,200 meters. 11,800. He climbed higher and higher, as though on a ladder. Ditching everything that was not absolutely essential, he climbed to 13,000 meters. Descending from this altitude he switched off the motor thus saving 40 kilograms of gas. This meant that in the next flight these 40 kilograms would not be needed and the airplane's weight would be the lighter for it.

Getting ready for the record flight, Kokkinaki took on enough gas for the trip only. 6,500 meters. The pilot "did a platform," that is, he brought the plane into horizontal position so as to cool off the engine. The second "platform" took place at 8,500 meters, the third one at 11,800. A strange apathy took hold of the pilot, and his motions becoming sluggish, slow.

But he stubbornly fought on up. Having reached 14,000 meters the plane virtually stopped climbing. But the pilot proved hardier than the machine. He coerced the plane to climb another 100 meters, than another 50. To climb the last 1,500 meters had taken as much time as that required to climb the preceding 13,000.

On that day Kokkinaki reached 14,575 meters altitude in the "I-15" plane designed by N. N. Polikarpov. No pilot before him in the world had climbed that high. When he landed Kokkinaki told his friends:

"I had reached almost the limit of endurance of my machine but I could have climbed on higher. Let's squeeze a little more out of the machine. I will soon raise the ceiling."

Afterwards the simple lad from Novorossiysk, whom the Soviet State had rewarded with mighty wings, showed repeatedly what achievements our pilot is capable of, provided he is inspired by the noble aspiration to glorify his Socialist Fatherland.

"We cannot visualize aviation," said Kokkinaki, "without cargo transport ... Otherwise the plane will uselessly iron the air."

The interests of the national economy and defense dictated that Soviet pilots strive constantly to raise the ceiling of their aircraft carrying a useful cargo aboard.

At that time the record altitude flight with a half-ton load aboard was 10,285 meters and was held by the French pilot Sinerin.

"We can fly higher!," declared the Soviet pilot Kokkinaki.

On 17 July 1936 he set out on his record flight in the twin-engine "TsKB-26" transport plane designed by S. V. Il'yushin. The start was at 2030 hours. One hour and three minutes later the plane landed safely in the darkening dusk. The barograph showed that an altitude of 11,458 meters had been reached. Sinerin's record was surpassed by a wide margin.

At this time our country had joined the International Aviation Federation and the record set by Kokkinaki was the first world record by a Soviet pilot to be officially registered with the IAF.

Nine days later, on 26 July 1936, Kokkinaki climbed to 11,402 meters, flying the same plane, but with one ton of cargo aboard, surpassing by 2,422 meters the world record which also was held by a French pilot.

Kokkinaki flew his last in a series of record altitude flights on 7 September 1936. Flying the "TsKB-26" with two tons of cargo aboard, he climbed to 11,005 meters, exceeding the record set by the Italian pilots Mauro and Oliveri.

The struggle for altitude has been successfully waged also by other Soviet pilots. Pilot A. B. Yumashev distinguished himself singularly in this field of endeavor. Four days after Kokkinaki had set the altitude record for two tons of cargo, on 11 September 1936, Yumashev flew the "ANT-6" with five tons of freight aboard to 8,116-meters altitude, thus beating the record of 6,649 meters set by French pilots.

On 16 September 1936, A. B. Yumashev established a new world record by climbing to 6,606 meters with ten tons of cargo aboard, while four days later, on 20 September, with twelve tons of cargo aboard, in the same "ANT-6" he climbed to the record altitude of 2,700 meters. On 28 October, Yumashev beat his own record by climbing to 8,980 meters with five tons of cargo aboard.

In proportion to the improvement in domestic aircraft engineering, new opportunities for setting records revealed themselves. On 1 November 1936, pilot M. Yu. Alekseyev set a world record altitude flight by flying the twin-engine "ANT-40" to 12,695 meters with one ton of useful cargo aboard. On 11 November, M. A. Nyukhtikov, who had bettered one of Yumashev's records, climbed to 7,032 meters with ten tons of cargo aboard in a four-engine aircraft designed by V. F. Bolkhovitinov. On 20 November, Nyukhtikov established yet another world record by flying the

same plane to 4,535 meters altitude with thirteen tons of useful cargo aboard.

The struggle for altitude waged by Soviet pilots did not cease in the ensuing years. On 25 April 1937, pilot A. K. Yershov flew the "ARK-3" hydroplane to the record altitude of 9,190 meters with one ton of cargo aboard. From 22 to 25 May, woman pilot P. D. Osipenko set three world records for altitude flight in the the "MP-1" hydroplane: 8,864 meters without the control load aboard; 7,605 meters with one-half ton of cargo aboard; and 7,009 meters with one ton of cargo aboard. On 15 October, woman pilot V. S. Grizodubova set the world altitude record of 3,267 meters in the sports plane "UT-2."

Our pilots have assuredly taken the world's first place in all records for altitude flights with useful cargo aboard.

The Purpose of Life

Where is that step that a young man takes and so at last finds the purpose of life and sets out on the only correct road for him, the road leading to true genius? We frequently meet young men for whom some chance circumstances had played a decisive role in choosing their profession and specialty. Yet it is difficult to expect great accomplishments. It is a different matter, however, when the man is sure in the choice of his life's path, when he puts his whole soul into the realization of his plans.

Today the name of aircraft designer Aleksandr Sergeyevich Yakovlev is famous not only in our country but far beyond its borders as well. He is a Colonel General, twice Hero of Socialist Labor, and a Deputy to the USSR Supreme Soviet.

But, before he became a creator of winged machines, the Moscow schoolboy Shura Yakovlev had applied himself hard and thoroughly. The powers leading to craftsmanship gradually grew and matured.

Son of a modest employee in the Moscow office of the oil firm "Nobel Brothers," Shura attended a private school for men and later a Soviet school. It may seem strange that his favorite subjects were history, geography, and literature, rather than physics and mathematics. But this fact did not stop him from joining the school's radiotechnical group and later the aircraft model and design groups.

In his childhood, Shura Yakovlev read voraciously about inventors, voyagers, and generals. The books sparked in him an interest in engineering; they taught him to dream and exercise his fancy. The heroes of his favorite volumes had fought stubbornly to achieve their goals, never fearing the unpleasant tropes. It was quite natural, therefore, that the youngster should try to imitate them.

That is perhaps why Yakovlev decided when he had finished secondary school: his path to aviation must begin straight from the airport and the hangar, and not from the student hall. So Shura spent four years working in airport shops.

"I do not regret," writes A. S. Yakovlev, "not having enrolled immediately in a university and thus receiving my diploma four years after some colleagues of my own age. But in return I gained experience in the collective and became an engineer, having learned not only how to design an airplane part, but also how to make it on the bench or lathe, and how it will behave in the airplane. I believe that every engineer should go through such a school in his specialty. Not without reason did the railway engineers of old have to go on a rather long tour of duty on trains as firemen and then as engineers, while the job on the trains was not any easier than ours on the airports. How right that is!"

His designing work started with the design of a glider. Although the young man did not part ways with his books, plucking from them, as

from life itself, much that is important and useful, nevertheless he realized his own inadequacies. It became necessary to apply himself to self-education more energetically, and that frequently meant burning the midnight oil. Ah, but what satisfaction was experienced by the young designer when all the calculations had been finished and checked!

But where to build the glider?

The answer came quickly: in the school where he was studying. Here the glider group started its work, with the group members all turning into builders. The design was a success. At the Second All-Union Glider Competition in Koktebel, Yakovlev's glider rose quietly into the air.

Some time had elapsed and the building of the first airplane began. Money collected by the Moscow Pioneers was donated to the cause. Yakovlev's friends in the flight detachment of the Air Force Academy imeni N. Ye. Zhukovskiy, in which he served at the time, participated actively in the work. In May 1927, the plane was in the air. It was piloted by one of the best pilots of that time -- Yulian Piontkovskiy.

The first examination as aircraft designer was passed successfully. "That was the happiest day in my life," recalls Yakovlev.

Soon thereafter a competitive flight was held along the route Moscow-Khar'kov-Sevastopol'-Moscow in which the designer himself participated. The flight showed the fine qualities of the airplane which he had built. Two world records were set at this time -- flight distance and endurance. The biggest award for the designer was his admission to the Air Force Academy.

His Academy studies were fruitful and creative. Suffice it to say that here Yakovlev designed three airplanes: a biplane on pontoons, a monoplane which flew non-stop from Moscow to Mineral'nyye Vody, and a four-place passenger plane.

After a while there was set up a design office headed by Yakovlev. The office and a test show were quartered in the area of the compartment shop.

At the time this was a small brick one-floor garage. But go there today and you will see a modern plant equipped with the latest machine tools. The entire area of the plant has been landscaped. The rooms where designers work and the shops where creative schemes turn into reality are sparkling with perfect cleanliness and order.

It is difficult to list everything that has been accomplished by the talented designing crew led by Yakovlev for a quarter of a century. Here you will find training craft, fast pursuit fighters, a hugh cargo glider, and our country's biggest helicopter.

In the thirties the basic training craft was the biplane "U-2". After the pilot had finished his training course in this aircraft, in order for him to transfer to a fighter he had in fact, to learn, all over again. The designer proceeded to set for himself this job -- to design a plane which would enable a pilot to be retrained for military combat aircraft with a minimum loss of effort. So the "UT-2", a fast momoplane which successfully executed advanced aerobatics, was built.

The high qualities of this plane as a sports machine were displayed in an all-union air race, in which the "UT-2" won first place. This same plane displayed the fastest speed in the races held between sports and training aircraft.

When the Soviet Government announced the competition for building a fighter plane, the design office headed by Yakovlev took part in it.

The work proceeded under exceptional tension. The crew of designers and workers built a fighter whose flying qualities exceeded all other planes. This was the "Yak-1." In the war which soon began, Soviet aviators successfully fought the enemy in these "Yaks."

Meanwhile, the design office worked unceasingly to improve the range, altitude, and speed of these planes. During the war there appeared the "Yak-9D" fighter (long range). This plane was capable of non-stop flight for a distance three times as great as that covered by a conventional fighter. Our pilots flew non-stop to Italy on orders from the government. Although the flight took place a day after the Fascists had taken Rumania, Bulgaria, and Yugoslavia, the enemy was powerless to prevent the flight. Our fighters were faster.

The first Soviet heavy cannon fighter, the "Yak-9," earned high praise from our pilots. It was equipped with a large-caliber aircraft cannon representing a remarkable achievement of our designers. Enemy bombers suffered huge losses at the hands of the new fighters. A shell hitting a German plane made rubble out of it.

The "Yak-3" light fighter proved itself handsomely in the field of combat. Using the same engine as in "Yak-1" it was possible to raise the speed as well as altitude and maneuverability of the plane. The best testimony to the exceptional qualities of these fighters were the reports coming from the fronts. For example, in a dogfight lasting seven minutes two of our pilots downed four out of eight "Fokke-Wulf". One of the orders issued by the German Command had this to say: "Pilots of fighter units are to be strictly instructed: when spotting the enemy "Yak" fighters showing a tilted antenna and minus the oil cooler in the nose, do not engage in a fight."

In postwar years Yakovlev and his crew built one of the first Soviet fighters equipped with the reaction /jet/ engine. It was necessary to build a plane which would convince the pilots that it was no more complex to control than a conventional plane with piston engine. This goal was attained: in the "Yak-15" only the nose part was thoroughly modified, all the rest being left virtually intact.

The beginning of the flight careers of many thousands pilots is linked with aircraft bearing the name of Yakovlev. Starting on his career as a designer of training aircraft, A. S. Yakovlev pursues his work today by constantly improving and perfecting the "Yak-18" -- a basic training plane for the aeroclubs of the Soviet Union.

Aleksandr Sergeyevich Yakovlev and his crew are now working successfully to advance modern aircraft engineering.

The goal of life toward which the illustrious designer has worked, and which he has attained, finds its fulfillment in new aircraft flying still higher, faster, and farther.

Altitude, Range, Speed

Artem Ivanovich Mikoyan -- aircraft designer, maker of fine, fast fighters whose fighting qualities displayed themselves convincingly during the years of the Great Patriotic War has gone through a capital school.

A. I. Mikoyan passed his childhood years in a remote mountain village in Armenia called Senain. His carpenter father taught the value of work to his children from an early age. Artem did his share in helping the family. After the Great October victory he went to Tbilisi where

he enrolled in a school. A little later he shifted to Rostov-na-Donu, where he began studies in a factory college. Soon the young man became a turner apprentice in the "Krasnyy Aksay" Plant. Years pass on and we find the young turner behind a lathe in the Moscow "Dinamo" Plant. Then followed a hitch in the Red Army, party work in Moscow, and meanwhile preparation for admission to the Air Force Academy imeni N. Ye. Zhukovskiy.

Thus began the realization of a perhaps not altogether perceptible dream. Indeed the dream was conceived in his childhood, when Artem by chance saw a plane for the first time in his life. This is how it happened. Flying between mountain passes, the plane "Farman" was forced to land near Sanain. Naturally enough the winged machine attracted all the village youngsters. Artem passed that whole night near the airplane. The memory of this event has remained with him his whole life.

In the Academy, Mikoyan was active in public affairs and was elected secretary of the part organization of the first course.

In those years parachuting was just beginning to come forth; not everybody was willing to jump from an aircraft. Communist Mikoyan was one of the first in the Academy to volunteer to jump.

The future designer strove to understand, to feel the pulse beat of the plane aloft, to know the key features of the aircraft. He joined one of the Moscow aeroclubs, where he passed his basic training. The day he took his first solo flight was a very happy one for the young designer.

For A. I. Mikoyan, theory and practice go hand in hand. With two colleagues in the course he worked out the plan for the training plane "Oktyabrenok." The use of flaps and ailerons permitted a sharp reduction in landing speed, which is very important for the flight qualities of any flying machine. At 120 kilometers per hour flying speed the "Oktyabrenok" had a landing speed of only 40 kilometers per hour.

Mikoyan graduated with distinction from the Academy's Engineering Faculty. His work began in the design bureau under the supervision of the senior Soviet designer N. N. Polikarpov. Here Mikoyan got to know M. I. Gurevich, A. G. Brunov, N. Z. Matyuk, and other aircraft engineers whose creative association subsequently attained great achievements.

A short time later Mikoyan, who had started out on independent work, together with Gurevich and a young crew all fired up with creative flame, built the first high-altitude fighter, named the "MIG-1". The fighter was designed and built in record short time -- three months in all.

In order to visualize what a great step the building of "MIG-1" was for the progress of our aviation, it is sufficient to cite but two figures. The aircraft "I-16" and "Chayka," then in Soviet Army service, had a speed of 450 kilometers per hour. The speed of the "MIG-1" was 626 kilometers per hour. This was an excellent index for those years.

The first flight of the "MIG-1" took place in March 1940; state tests were completed in August. When this fighter was ready the designers were given a new job: to increase the range of its flight and boost its armament. Thus the "MIG-3" came into being, which was used by Soviet aviators to inflict heavy blows on the enemy during the Great Patriotic War. The commanders of the first two fighter squadrons armed with "MIG-3" fighters were the well known test pilots P. M. Stefanovskiy and S. P. Suprun.

Meanwhile, the design bureau continued with the development of a specialized high-altitude fighter; its ceiling was upped by several thousand meters.

During the war, Mikoyan was appointed director and chief designer of an experimental aircraft manufacturing plant. An able organizer and an energetic and talented designer, he found ways in those hard times to gather together a crew, and to direct their efforts in the building of aircraft for the fronts. These planes showed themselves superior to the enemy craft.

The postwar years are characterized by the swift development of reaction aircraft. The design office headed by Mikoyan is working fruitfully in this field. His achievements may be judged by one of the first Soviet reaction airplanes, "MIG-9." In order for the plane to develop as great speed as possible, it was necessary to improve its aerodynamic qualities. This was accomplished by mounting the "MIG-9" engines abreast of each other, thus freeing the wing from gondolas. The drag was thus sharply reduced. The view was improved by moving the pilot's compartment forward. The pilots dubbed the "MIG-9" cabin view the "balcony," meaning that everything could be seen from it as from a balcony. The plane had an unusually broad range of speed: from 220 to 864 kilometers per hour at sea level, and 911 kilometers per hour at 5,000 meters altitude.

The single-place "MIG-15" fighter has earned widespread fame among the other high speed aircraft. This plane embodies the best and most advanced ideas inherent in our designers. Any pilot of intermediate qualification can easily master the piloting technique in this aircraft. The plane has a low landing speed and excellent maneuverability in horizontal flight. Soon after the "MIG-15" had gone into service with the Air Forces it earned universal admiration of the pilots, who named it the "aircraft soldier."

A very important phase in the building of modern air forces is assigned to training planes which are transitional between the aircraft used in basic training and the high speed combat aircraft. This category of planes includes the two-place version of the "MIG-15" (UTI) fighter /UTI: Ychebno-trenirorochnyy istrebitel8 -- fighter-trainer/.

As in a man who is creatively seeking new ways to improve the aircraft industry, inherent in Artem Ivanovich is a broad outlook and the ability to see the total picture of the progress of aircraft manufacturing.

Three fundamental criteria, says A. I. Mikoyan, determine the success or failure of aircraft designing -- speed, range, and altitude of flight, The speed of our aircraft has been increased many times in the past twenty years. Figures graphically show the rapid development of our aircraft engineering, which is moving forward not in a straight line nor by progressive advance, but by jarring jumps. While today our reaction airplanes are flying faster than sound, yet in the near future they will outdistance the sound waves so far that we in Moscow will hear the sound of the flying plane only when it shall have reached, say, Gor'kiy or Sverdlovsk ...

The design office workers and their leader, A. I. Mikoyan, are hard at work building new Soviet combat aircraft.

The Airplanes of O. K. Antonov

On 17 April 1958 the newspaper "Pravda" carried the following item: "Today a new 100-place passenger plane the "AN-10," designed under the supervision of designer O. K. Antonov, landed on the Voronezh airport. After the halt, it proceeded on its cross-country flight. This flight represents the culmination of factory testing of the new airliner."

The cross-country flight of a new plane represents the peak of creative efforts of the talented crew of designers, engineers, mechanics, and workers; the result of their long and intense labor. All of them, from chief designer Oleg Konstantinovich Antonov and supervising designer of the "An-10" Nikolay Stepanovich Trunchenkov, down to the assembly workers who have put into the aircraft all their know-how, their long years of experience; they have worked to make it the most comfortable, economical, and beautiful airliner.

Supervising engineer of the "AN-10" N. S. Trunchenkov tells how this plane came into being. First a rough draft was drawn up, followed by simulated computations which helped to clarify what the new design would yield, what would be its speed, ceiling, range, weight, length of run and start.

This was followed by the designing of the new airliner, a very complex and laborious task. It was necessary to determine the center alignment of the plane, weight of its individual units and assemblies, size of cabins; to define its exterior outlines; to plan the arrangement of equipment, layout of electric cables, hydraulic system feed, and controls. Considerable attention was devoted to the technological aspects of units and assembly fabrication.

The engineers worked inspiringly. They constantly sought new ways, boldly tackled complicated problems, striving to make the new plane as stable as possible while at the same time achieving lightness of construction.

And now the plane is wheeled out of the huge shop onto the plant's airport. The huge silvery plane involuntarily draws attention to itself by its unusual external appearance -- wide fuselage and long narrow wings. Four turboprop engines are mounted on the wings. Despite the fact that the engines are capable of develpping vast horsepower, they are very compact and appear altogether miniature. Let's add, by the way, that the engines use low-grade fuel and burn it in much smaller quantities than the turbo jet engines.

Let's tour the airliner's interior. Up along a low gangway we approach the airliner and step through the front entrance into the vestibule. A corridor leads off to the left, with its cloak-room and a compartment for baggage. Farther on there are three spacious passenger drawing-rooms painted in light tones and lighted with frosted dome lights. Soft folding armchairs covered with gold-colored velvet are arranged three

abreast on either side of the center passageway. There is an electric lamp and a pair of radio earphones by each armchair. The passenger may, if he so desires, pull out a little table which is concealed in the housing of the chair in front of him. Along the sides, at eye level, there are round windows with slightly convex glass. Overhead are racks for light baggage.

In addition to passengers, the airliner can take on three and a half tons of freight. The freight compartments are located under the passenger drawing-rooms and are situated at the truck landing level.

The usual flight altitude of the "An-10" is 8,000-10,000 meters. The passengers do not, however, feel this height because the airliner has been made hermetically tight and enjoys excellent heat-sound insulation. The drawing-rooms are equipped with floor heat and a well adjusted air conditioning system. The engine noise is barely audible, so that passengers may talk without raising their voices.

Everything has been thought out in this airliner to make the passengers as comfortable as possible. There is even a kitchen so that it is possible to enjoy a hot meal in flight.

The pilot and copilot cabins are equipped down to the last word of engineering. They have modern piloting and navigation instruments enabling the airliner to fly day or night, under any meteorological conditions.

The cruising speed of the "An-10" is 600-650 kilometers per hour, yet its landing speed is relatively slow. The airliner does not require special, large concrete strips. It can take off and land on ordinary dirt airports. Due to the high economy of the new turboprop airliner, transportation costs for it are 30-35 percent lower than in contemporary piston aircraft. The "An-10" has been designed to fly up to 3,000 kilometers without landing.

The "An-10" has passed its tests with flying colors. The preliminary flights were completely normal; the plane excelled in a simple and easy control. It will doubtless be widely employed on the standard transport air routes now being plied by piston aircraft.

After the "An-10" the design crew headed by O. K. Antonov built the twin-engine "An-14" passenger plane, named the "Pchelka" (the Bee).

The name is not accidental. Like a bee this plane stands out for its unique "industriousness." Approximating the helicopter by its qualities, the "Pchelka" can take off from and land at a field camp, on a highway, or a kolkhoz threshing floor; it requires a very small spot for its take-off and landing. This makes it possible to use the "An-14" for fast communication within an oblast; for flying the mail, the sick, and light freight; and for doing the various agricultural chores.

In its passenger version, the "Pchelka" is a comfortable 8-place limousine, including heating and ventilation, suitable for local air routes. In addition to passengers, it can take on 150 kilograms of freight. The transport of men and freight directly to their points of destination eliminates the additional expense of transfers and thereby increases still more the economy feature of this plane.

The "An-14" crew consists of one man. However, its cabin is easily converted to seat two. This makes the "Pchelka" suitable for use as a basic training plane for pilots. It is also suitable for sports purposes: parachutists can easily jump from its rear cabin door.

The characteristic feature of O. K. Antonov's aircraft is solid flight safety. For example, should one or even two of the turboprop

engines fail, the plane can continue on its flight without any trouble at all.

The "An-14" is equipped with two engines of the "AI-14R" type, having take-off horsepower of 260 each. In one hour of flight they burn up only about 70 liters of gas. Should one engine fail, the "Pchelka" can maintain its horisontal flight on the power of the other.

Our Helicopters

The helicopter is a remarkable machine capable of taking off and landing vertically and of hovering motionlessly in air. The helicopter enables us to establish communication with the least accessible regions, from which an airplane can neither take off nor land.

The buoyancy which keeps an airplane in air is created by the fast moving wing which must have a certain angle with reference to the inflowing air stream. Meanwhile, an area of increased air pressure is created under the wing, and above the wing -- an area of vacuum. The result is the aerodynamic force which balances the airplane's weight.

The airplane has fixed wings, consequently it must be raced in order to develop the lifting power. A helicopter's wings are rotor blades, which are joined to the hub by horizontal and vertical hinges. The helicopter's rotor blades generate lifting power in accordance with the same physical laws as does the airplane wing, while the latter requires, in addition, a running speed in air. A helicopter's engine supplies the necessary rotating speed to the blades. That is why the racing of the helicopter itself is not necessary in order to develop lifting power.

The pilot can fly his craft horizontally in any direction: forward, sideways, backward. This requires tilting the pull of the rotor to the desired side by operating a special device.

The basic mechanism controlling the helicopter is the so-called autogiro.

The pilot controls the helicopter by means of the control stick. Due to the action of the autogiro the nagle of tilt of each blade changes periodically from the maximum to the minimum during the rotation.

The autogiro scheme was first proposed in 1911 by B. N. Yur'yev, one of the most talented students of N. Ye. Zhukovskiy, later a member of the USSR Academy of Sciences and an outstanding expert in aerodynamics.

Of the multitude of problems which helicopter designers had to overcome, the paramount one was the reaction effect of the rotor, tending to turn to the side opposite the fireaction of the blade rotation. In the single rotor helicopter, i.e., having one supporting propeller, its reactive effect is neutralized by a small rotor mounted on the tail. By varying the angle of tilt of this rotor the pilot can execute right and left turns. A system of gears, neutral and engaged clutches, decelerators -- the so-called transmission system -- supplies the engine power to the propellers, thus providing the requisite rotation speed.

Engine failure cannot stop the pilot from making a safe descent. In the event of power failure the rotor is disengaged from the engine and by changing the blade tilt, the rotor is made to autorotate. The rotor keeps on rotating, utilizing the force of the inflowing air.

Soviet designing offices have built a number of outstanding helicopters of various systems which have now gone through many years of serial production.

N. I. Kamov has designed an original coaxial light helicopter. It can make use of even such "take-off and landing" area as a truck platform.

As a motorcycle is without the body typical of an automobile, so also is Kamov's "air motorcycle," the "Ka-10", without the usual fuselage. In its stead stands a girder made of metal tubing. A small four-cylinder 55-horsepower engine rotates two three-blade coaxial rotors through its reducing gear.

In place of the usual landing gear the "Ka-10" helicopter has two oblong balloons made of rubberized cloth, enabling it to land even on water.

Kamov's "air motorcycle" excels in its flight qualities; it is very maneuverable, light, and small in size. This remarkable machine represents the first attempt in the world at practical use of coaxial helicopters. Kamov's subsequent, much improved machines represent a vivid proof that the attempt has succeeded brilliantly.

Having tested the coazial system on the "air motorcycle," and having convinced themselves of its many positive qualities, the crew headed by its chief designer, N. I. Kamov, built the noted helicopter "Ka-15."

The numberous flights in this machine made possible a more thorough analysis of the characteristics of coaxial rotor helicopters. "Ka-15" has fully justified the hopes of its builders. Pilot A. V. Vinitskiy has set two world records in it. On a 100-kilometer land route it registered 163 kilometers per hour; on a 500-kilometer route, 170 kilometers per hour speed.

By introducing a number of improvements, by making a more comfortable and bigger 4-seater cabin, Kamov then came forward with a real "flying automobile," the "Ka-18" helicopter.

Helicopters designed by M. L. Mil' -- "Mi-1" and "Mi-4" -- have received widespread acceptance in our country. Both these machines represent a significant achievement of the Soviet helicopter industry.

The "Mi-1" has one 3-blade support rotor and one, also 3-bladed, tail rotor. The motor develops 570 horsepower. The cab can accommodate three and even four persons. It has a three-wheel landing gear. The helicopter develops a speed of 205 kilometers per hour. Its practical ceilingexceeds 5,300 meters. Production techniques having been mastered long ago, and the helicopter now being produced in series, it is being widely used for passenger and freight traffic, for geological surveys, in agricultural chores, in sanitation service, and in forest fire protection.

The "Mi-4" is a much bigger helicopter. It has a four-blade main rotor and a three-blade tail rotor. The engine develops 1,700 horsepower. Its spacious cab can accommodate up to 12 passengers. It can take on 1,200-1,600 kilograms of cargo. Its special freight hatch can freely admit a "GAZ-69" or a "Pobeda" automobile.

The helicopter has fixed, four-wheel landing gear.

The helicopter has dual controls. The seats for the crew of two are abreast of each other. Excellent navigation and radio equipment enable it to fly blind and at night. It has been equipped also with an effective de-icing system.

Utilizing creatively the accumulated experience in designing and using helicopters with piston engines, the crew headed by M. L. Mil' has

built a new huge helicopter, the "Mi-6," equipped with two powerful turbo-prop engines.

Remarkable indeed is A. S. Yakovlev's heavy helicopter, the "Yak-24." Its fuselage resembles a flying boxcar, with a four-blade rotor swirling on the front and rear portions of it.

Such has been the helicopter progress in our day, while the foundations leading to its creation were scientifically laid for the first time by our great Russian scientist Mikhail Vasil'yevich Lomonosov.

Soviet designers are improving these helicopters and building new ones. The helicopter fleet of our Air Fleet is growing with each passing day. That remarkable machine -- the helicopter -- is finding wider and wider use.

10,250

-END-